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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,670	06/18/2001	Ryuichi Matsuda	209667US-2	7193
22850	7590	06/02/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			ALEJANDRO MULERO, LUZ L	
			ART UNIT	PAPER NUMBER

1763

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/881,670	Applicant(s) MATSUDA ET AL.	
	Examiner Luz L. Alejandro	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3,4,11 and 18-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3,4,11 and 18-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0404</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 04/28/04 has been considered by the examiner and a signed copy is enclosed hereby.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 18, 20-21, 23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification, as originally claimed, does not describe at least two coils having a first radial tightness and the another coil having a second radial tightness different from the first radial tightness as claimed in claims 18 and 21. Additionally, the specification, as originally claimed, does not describe wherein the at least two coils comprises a third coil, the third coil being a two-turn coil, as claimed in claims 20 and 23.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 19 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 1 of claims 19 and 22, the phrase "another coil" should read "the another coil" or "said another coil" for a clear understanding of the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3-4, 11, and 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent 6,288,493 in view of Holland et al., U.S.

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Patent 5,800,619 and Kazumi et al., US 6,180,019 or Ishii et al., US 5,571,366 or Patrick et al., US 5,401,350.

Lee et al. shows the invention as claimed including a semiconductor manufacturing apparatus 10 comprising: a vessel 104 having an electromagnetic wave transparent window; a power supply antenna 100/100' provided outside the vessel and opposed to the electromagnetic wave transparent window; and a power source 102/102' for applying a high frequency voltage to the power supply antenna; and being adapted to apply the high frequency voltage from the power source to the power supply antenna to generate an electromagnetic wave, and pass the electromagnetic wave through the electromagnetic wave transparent window into the vessel to generate a plasma, thereby treating a surface of a substrate 106 in the vessel 104, wherein the power supply antenna comprises a plurality of coils 310a, 310b, 310c disposed concentrically on a common plane, the plurality of coils comprising a plurality of conductors bent into a form of an arc, and power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source, the power supply portions located in different phases on the common plane (see figs. 1 and 3B, col. 1-line 43 to col. 2-line 2 and col. 3-line 34 to col. 4-line 67).

Lee et al. does not expressly disclose that at least one of the coils is disposed on a plane parallel to the common plane. Holland et al. suggests positioning coils in many different planes above a dielectric window (see col. 14-lines 10-23). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Lee et al. so as to produce a coil

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structure as suggested by Holland et al. because this produces an apparatus with a plasma having a relatively uniform density (see col. 13-lines 46-51).

Lee et al. and Holland et al. do not expressly disclose that the another coil is a two turn coil. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made that such configuration is an obvious choice of design to generate a plasma with a desired plasma uniformity. Furthermore, Kazumi et al. discloses that by varying the number of turns of a coil the plasma distribution can be controlled to establish an uniform plasma (col. 11-line 53 to col. 12-line 13 and col. 13, lines 20-25). Additionally, Ishii et al., discloses that when the number of turns in the coil is changed the density distribution of the plasma can be adjusted with higher precision (see col. 9, lines 59-63). Also, Patrick et al. discloses that by careful selection of the number of turns of a coil uniform plasma density could be achieved (see, for example, col. 4, lines 13-24, and 43-51). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Lee et al. modified by Holland et al. as to comprise the another coil as a two turn coil because such configuration is an obvious choice of design to: a) generate a plasma with a desired plasma uniformity, b) control the plasma distribution to establish an uniform plasma, c) adjusted the density distribution of the plasma with higher precision, and d) achieve uniform plasma density.

Lee et al., Holland et al., Kazumi et al., Ishii et al. and Patrick et al. do not expressly disclose where spacing between the adjacent power supply portions in the respective coils is equal. However, it would have been obvious to one of ordinary skill

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in the art at the time the invention was made to determine through routine experimentation the optimum spacing between the power supply portions in adjacent coils based upon a variety of factors, including reducing potential problems such as cross over of wires connecting different coils to the power supply that can lead to shorting, and such limitation would not lend patentability to the instant application absent the showing of unexpected results.

With respect to claims 18-19 and 21-22, it should be noted that the coils of the apparatus of Lee et al. modified by Holland et al. and Kazumi et al., Ishii et al. or Patrick et al. will comprise at least two coils having a first radial tightness and the another coil having a second radial tightness different from the first radial tightness, and also the another coil will have a diameter different from a total diameter of the at least two coils.

Regarding claims 20 and 23, it should be noted that Lee et al. in figure 5, discloses an embodiment wherein four coils are used to generate the plasma and thereby such apparatus modified by Holland et al. and Kazumi et al., Ishii et al. or Patrick et al. would comprise the claimed limitations.

Claims 3-4, 11 and 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent 6,288,493 in view of Hemker et al., U.S. 2004/0011467 and Kazumi et al., US 6,180,019 or Ishii et al., US 5,571,366 or Patrick et al., US 5,401,350.

Lee et al. shows the invention as claimed including a semiconductor manufacturing apparatus 10 comprising: a vessel 104 having an electromagnetic wave

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transparent window; a power supply antenna 100/100' provided outside the vessel and opposed to the electromagnetic wave transparent window; and a power source 102/102' for applying a high frequency voltage to the power supply antenna; and being adapted to apply the high frequency voltage from the power source to the power supply antenna to generate an electromagnetic wave, and pass the electromagnetic wave through the electromagnetic wave transparent window into the vessel to generate a plasma, thereby treating a surface of a substrate 106 in the vessel 104, wherein the power supply antenna comprises a plurality of coils 310a, 310b, 310c disposed concentrically on a common plane, the plurality of coils comprising a plurality of conductors bent into a form of an arc, and power supply portions formed at opposite ends of the respective coils so as to be connected to a high frequency power source, the power supply portions located in different phases on the common plane (see figs. 1 and 3B, col. 1-line 43 to col. 2-line 2 and col. 3-line 34 to col. 4-line 67).

Lee et al. does not expressly disclose that at least one of the coils is disposed on a plane parallel to the common plane. Hemker et al. discloses stacking coils in planes parallel to each other in order to promote symmetric coupling (see, for example, paragraph 0058 and fig. 1). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Lee et al. so as to arrange the coils in a stack configuration as suggested by Hemker et al. in order to promote symmetric coupling for creating a high level of processing uniformity.

Lee et al. and Hemker et al. do not expressly disclose that the another coil is a two turn coil. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made that such configuration is an obvious choice of design to generate a plasma with a desired plasma uniformity. Furthermore, Kazumi et al. discloses that by varying the number of turns of a coil the plasma distribution can be controlled to establish an uniform plasma (col. 11-line 53 to col. 12-line 13 and col. 13, lines 20-25). Additionally, Ishii et al., discloses that when the number of turns in the coil is changed the density distribution of the plasma can be adjusted with higher precision (see col. 9, lines 59-63). Also, Patrick et al. discloses that by careful selection of the number of turns of a coil uniform plasma density could be achieved (see, for example, col. 4, lines 13-24, and 43-51). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Lee et al. modified by Hemker et al. as to comprise the another coil as a two turn coil because such configuration is an obvious choice of design to: a) generate a plasma with a desired plasma uniformity, b) control the plasma distribution to establish an uniform plasma, c) adjusted the density distribution of the plasma with higher precision, and d) achieve uniform plasma density.

Lee et al., Hemker et al., Kazumi et al., Ishii et al. and Patrick et al. do not expressly disclose where spacing between the adjacent power supply portions in the respective coils is equal. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum spacing between the power supply portions in adjacent

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coils based upon a variety of factors, including reducing potential problems such as cross over of wires connecting different coils to the power supply that can lead to shorting, and such limitation would not lend patentability to the instant application absent the showing of unexpected results.

With respect to claims 18-19 and 21-22, it should be noted that the coils of the apparatus of Lee et al. modified by Hemker et al. and Kazumi et al., Ishii et al. or Patrick et al. will comprise at least two coils having a first radial tightness and the another coil having a second radial tightness different from the first radial tightness, and also the another coil will have a diameter different from a total diameter of the at least two coils.

Regarding claims 20 and 23, it should be noted that Lee et al. in figure 5, discloses an embodiment wherein four coils are used to generate the plasma and thereby such apparatus modified by Hemker et al. and Kazumi et al., Ishii et al. or Patrick et al. would comprise the claimed limitations.

Response to Arguments

Applicant's arguments filed 3/15/05 have been fully considered, and some are moot in view of the new ground(s) of rejection (applicant's arguments with respect to the newly added limitation of the another coil being a two turn coil), and the other arguments are not persuasive as described below.

With respect to newly added claims 18, 20-21 and 23, it should be noted that such claims are rejected under the first paragraph of 35 U.S.C. 112 because, as stated above, the specification, as originally claimed, does not describe at least two coils

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having a first radial tightness and the another coil having a second radial tightness different from the first radial tightness as claimed in claims 18 and 21. Additionally, the specification, as originally claimed, does not describe wherein the at least two coils comprises a third coil, the third coil being a two-turn coil. Applicant states in the remarks/argument of the response that support for the newly added claims is found in figure 3, figure 8, specification page 25-line 24 to page 28-line 13, and specification page 15-line 26 to page 16-line 1, however, the examiner kindly disagrees since support for such limitations are not found either in the cited portions of the specification or in the rest of the specification. Furthermore, the examiner wants to respectfully point out that figure 3 and figure 8 are different embodiments of the invention (figure 3 has three coils all lying in a common plane while figure 8 has three coils wherein two coils lay in a common plane and the third coil lay in a plane different from the common plane) and it appears from the specification that they are not interrelated. Additionally, it should be noted that the outstanding independent claims are directed to the embodiment of figure 8 instead of the embodiment of figure 3, therefore, support for the limitations should be found solely in such figure (or any other figure derive from figure 8) or in the description in the specification of such figure. Also, even by mixing the teachings of both figures and their related descriptions, support for the limitations of claims 20 and 23 would not be found in the specification.

In response to applicant's arguments against the references individually (Lee does not disclose or suggest a third coil disposed on a plane parallel to at least two coaxial coils and Holland does not disclose that a coil disposed on a plane that is

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parallel to a plane that contains two or more other coils), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that the Lee reference fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., adjustable radii) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Regarding the arguments with respect to the Tobin and the Kazumi references, such arguments are moot since the limitation for which the references were cited is no longer recited in the pending claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Luz L. Alejandro
Primary Examiner
Art Unit 1763

May 27, 2005